

**Three new species of *Corchorus* L. and *Grewia* L.
(Sparmanniaceae / Malvaceae subfamily *Grewioideae*)
from northern Australia, an earlier name in *Grewia*, and
recircumscription of *Triumfetta kenneallyi* Halford**

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Summary

Barrett, R.L. (2019). Three new species of *Corchorus* L. and *Grewia* L. (Sparmanniaceae / Malvaceae subfamily *Grewioideae*) from northern Australia, an earlier name in *Grewia*, and recircumscription of *Triumfetta kenneallyi* Halford. *Austrobaileya* **10(3): 458–472**. *Corchorus drysdalensis* R.L.Barrett is described as a new species from the Drysdale River National Park. *Grewia pindanica* R.L.Barrett is described as a new species from the Dampier Peninsula. *Grewia savannicola* R.L.Barrett is described as a new species; it was previously confused with the Asian *G. retusifolia* Kurz. *Grewia guazumifolia* Juss. is an earlier name for *G. glabra* Blume, and considered distinct from *G. multiflora* Juss. The circumscription of *Triumfetta kenneallyi* Halford is reassessed based on recent collections and a new description is presented. The five species are all illustrated.

Key Words: Malvaceae; Grewioideae; Sparmanniaceae; *Corchorus*; *Grewia*; *Triumfetta*; *Corchorus drysdalensis*; *Grewia pindanica*; *Grewia savannicola*; *Grewia retusifolia*; *Grewia guazumifolia*; *Grewia multiflora*; *Triumfetta kenneallyi*; Australia flora; Western Australia flora; Northern Territory flora; Queensland flora; new species; morphology

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Introduction

This paper formally names a new species of *Corchorus* L. from the Kimberley region of Western Australia. Taxonomy of the stellate-haired species of *Corchorus* in north-west Australia is generally quite complex, with considerable variation in a number of taxa (see Halford 2004). The species named here is sufficiently distinct from all previously named taxa to warrant description at specific rank. *Corchorus drysdalensis* R.L.Barrett is only known from the type collection from Drysdale River National Park (NP) in the north Kimberley and is of conservation priority. *Corchorus drysdalensis* is unusual for its sparsely hairy (glabrescent) leaves and decumbent habit. Examination of specimens of *C. pumilio* R.Br. ex Benth. and *C. sidoides* F.Muell. held at PERTH found no additional collections, despite previous flora surveys in Drysdale River NP (Kabay & Burbidge 1977).

A new species of *Grewia* L. is described from pindan vegetation on the Dampier Peninsula as *G. pindanica* R.L.Barrett. First recognised as distinct from *G. retusifolia* Kurz *s. lat.* during surveys in the vicinity of James Price Point north of Broome in 2011, it is now known for a number of relatively localised areas on the Dampier Peninsula. Specimens of this taxon were included under *G. retusifolia* by both Rye (1992) and Kenneally *et al.* (1996). While studying *G. retusifolia s. lat.*, it was determined that this name applies to an Asian shrub or small tree, distinct from the small lignotuberous shrub common across northern Australia and extending to southern Papua New Guinea. No name at species rank has been located for the Australian taxon, so it is here described as *G. savannicola* R.L.Barrett.

David Halford (pers. comm.) suggested that *Grewia guazumifolia* Juss. may be an earlier name for *G. glabra* Blume. Examination of images of type specimens, and study of relevant literature on Asian

Grewia has confirmed that this is correct, and the earlier name is taken up here.

Collections of a small *Triumfetta* L. located under rock overhangs on Doongan Station in 2009 and 2012 were initially considered to be a potential new species. Further examination of collections of *T. kenneallyi* Halford resulted in the conclusion that the new collections from Doongan Station represented a small form of that species with many measurements outside the ranges presented in the available description of that species (Halford 1997). Accordingly, a revised description of *T. kenneallyi* is presented here.

Materials and methods

Descriptions are based on dried herbarium specimens following the formats of Halford (1993, 1997, 2004). All taxa have been examined in the field by the author in Western Australia, with *G. savannicola* also observed in the Northern Territory and Queensland. Specimens have been examined at CANB, MEL, NSW and PERTH. Images of non-Australian type specimens have been examined on *JSTOR Plants* (<https://plants.jstor.org>), *Naturalis* (www.bioportal.naturalis.nl) and *Muséum national d'Histoire naturelle* (<https://science.mnhn.fr>) [all accessed Aug. 2018].

Conservation assessments follow Conservation Codes for Western Australian Flora based on information reflecting the number, distribution and size of known populations.

To produce Scanning Electron Microscope (SEM) images, dry material was mounted on stubs using double-sided or carbon tape with conductive carbon paint, coated with gold using an EMITECH K550X Sputter Coater and imaged at high vacuum and high voltage (15 KV) using a Jeol JCM 6000 NeoScope bench-top SEM at Kings Park and Botanic Garden.

Taxonomy

1. *Corchorus drysdalensis* R.L.Barrett sp. nov. with affinity to *C. sidoides*, but differing by being a decumbent to spreading shrub to 20(–40) cm high and 80 cm across, mature

indumentum sparse; leaf lamina strongly discolorous, surface distinctly visible above, dark green; sepals with stellate hairs 0.05–0.2 mm long; fruit 2 or 3-valved; apex scarcely attenuate, not orientated downward, indumentum sparse. **Typus:** Western Australia. KIMBERLEY DISTRICT: Drysdale River National Park [precise locality withheld for conservation reasons], 9 March 2014, *R.L. Barrett RLB 8878* (holo: PERTH; iso: BRI, CANB).

Subshrub to 0.2(–0.4) m high, to 0.8 m across; stems much branched, procumbent to spreading, reddish in colour; young shoots with very sparse translucent-white or pale ferruginous indumentum. Indumentum on branchlets, leaves, stipules, peduncles, pedicels and bracts translucent-white or pale ferruginous, very sparse to moderately dense, comprised of stellate hairs. Stellate hairs sessile or shortly stipitate, 0.1–0.2(–0.4) mm across; stipes straight, to 0.1 mm long, white or ferruginous; rays firm to pliable, to 0.1(–0.2) mm long, translucent-white or pale ferruginous. Stipules subulate-linear, 1.5–2.6 mm long. Leaves with petioles 1.4–3.6 mm long; lamina narrowly oblong to oblong-elliptic, 5–31 mm long, 2.6–7.9 mm wide, l:w ratio 2–3.5:1, strongly discolorous, bright green above, sparsely hairy on both surfaces; base obtuse or rounded; margin often sinuose, shallowly serrate to serrulate; apex acute to rounded. Inflorescences umbellate, 2–5-flowered, leaf-opposed, solitary at upper nodes; peduncles 0.5–1.6 mm long; pedicels 1.1–2.3 mm long, spreading to erect in flower, erect to recurved in fruit; bracts subulate-linear to filiform-linear, 1.1–2.4 mm long. Flower buds obovoid, 1–1.4 mm across, not longitudinally ridged; apex acuminate-caudate with 5 erect caudae to 0.6 mm long. Sepals 5, not persistent, very narrowly obovate to almost lanceolate, 2.6–4.2 mm long, 0.4–0.7 mm wide; abaxial surface with a sparse to moderately dense indumentum of stellate hairs 0.05–0.2 mm long; adaxial surface glabrous or with scattered stellate hairs proximally; apex acute or acuminate-caudate, to 1.1 mm long. Petals 5; lamina narrowly obovate to obovate, 2.6–2.8 mm long, 1–1.2 mm wide, glabrous; claw 0.5–0.6

mm long, stellate-pubescent on margins. Androgynophore 0.1–0.2 mm long; annulus entire, 0.1–0.2 mm long, glabrous. Stamens 23–26, filaments 2.4–3.1 mm long, anthers 0.2–0.4 mm long. Ovary cylindrical, 0.3–0.4 mm across, densely stellate-villose, 2- or 3-locular, with 10–16 ovules in each locule; style 2.1–2.3 mm long. Fruits subcylindrical 15–34 mm long, 1–1.6 mm across, mostly 10–15 times longer than wide, spreading to erect, straight, curved or slightly twisted, circular in transverse section, slightly or markedly constricted between seeds, 2 or 3-valved; apex obtuse or attenuate, to 3.7 mm long, not orientated downward; indumentum sparse, stellate hairs to 0.1 mm long. Seeds compressed obovoid, 1.2–1.6 mm long. **Fig. 1.**

Distribution and habitat: *Corchorus drysdalensis* is known only from the type location in the Drysdale River NP in the north Kimberley region of Western Australia where it was locally common, but specific to an interzone habitat along a low laterite breakaway parallel to a large creek. Plants grow in open savanna woodland on shallow sand over a lateritic hardpan, growing with *Acacia dunnii* (Maiden) Turrill, *A. nuperrima* Baker f., *Afrohybanthus aurantiacus* (F.Muell. ex Benth.) Flicker, *Cajanus* sp., *Corymbia latifolia* (F.Muell.) K.D.Hill & L.A.S.Johnson, *Eucalyptus tetrodonta* F.Muell., *Euphorbia* sp., *Glycine* sp., *Goodeniocravenii* R.L.Barrett & M.D.Barrett, *G. redacta* Carolin, *Grevillea microcarpa* Olde & Marriott, *Haemodorum* sp. aff. *flaviflorum* W.Fitzg., *Murdannia* sp. aff. *graminea* (R.Br.) G.Bruckn., *Polycarpaea* sp., *Solanum tudununggae* Symon, *Sorghum plumosum* (R.Br.) P.Beauv., *Spermacoce* sp., *Tephrosia* spp., *Triodia* sp. aff. *bynoei* (C.E.Hubb.) Lazarides, *T. claytonii* Lazarides and *Triumfetta* sp.

Phenology: Flowering and fruiting known for March.

Affinities: Using the key from Halford (2004), this taxon would key to *Corchorus sublatius* Halford on the basis of the fruit apex not usually oriented downward, and very short peduncles, but that species is an erect shrub to 1.5 m with a denser indumentum and has the fruit held erect. If the alternate fruit apex

character is followed, then it keys best to *C. sidoides*, but not in all characters of lead 23 as the leaf epidermis is clearly visible.

Corchorus drysdalensis is similar in general appearance to *C. sidoides* with a low, spreading habit and somewhat sinuose fruit that are usually 2-valved (Halford 2004) and the two species are probably closely related. *C. drysdalensis* appears to be distinct from all subspecies of *C. sidoides* in the very sparse indumentum of shorter stellate hairs 0.1–0.2(–0.4) (versus to 0.5 or 2) mm across; leaves strongly discolorous, dark green above with the epidermis clearly visible; and sparsely hairy fruit that do not appear to have an attenuate apex that often points downward.

While *Corchorus sidoides* is a very morphologically variable species, with three subspecies recognised, *C. drysdalensis* can not readily be included within that variation. A large number of populations of *C. sidoides* subsp. *sidoides* and subsp. *vermicularis* have been examined in the field by the author across the Kimberley and Pilbara regions of Western Australia, including within Drysdale River NP. *Corchorus drysdalensis* differs from *C. sidoides* subsp. *sidoides* by the much sparser, finer indumentum, especially on the leaves and fruit.

Corchorus drysdalensis is more similar to *C. sidoides* subsp. *vermicularis* (F.Muell.) Halford in terms of the smaller fruit and sparse indumentum; however, the indumentum cover is even sparser than that subspecies. *C. drysdalensis* has young shoots with very sparse translucent-white or pale ferruginous (versus grey-white) indumentum. The leaf margins of *C. sidoides* subsp. *vermicularis* are also distinctive, commonly with well-spaced, tooth-like lobes or serrations.

The third subspecies, *Corchorus sidoides* subsp. *rostrisepalus* (Domin) Halford is usually an erect shrub. It does have smaller stellate hairs than the other subspecies, to 0.3 mm across, but at least those on young growth are distinctly ferruginous. It also has much larger leaves, 35–90 mm long, (5–)15–30 mm wide.

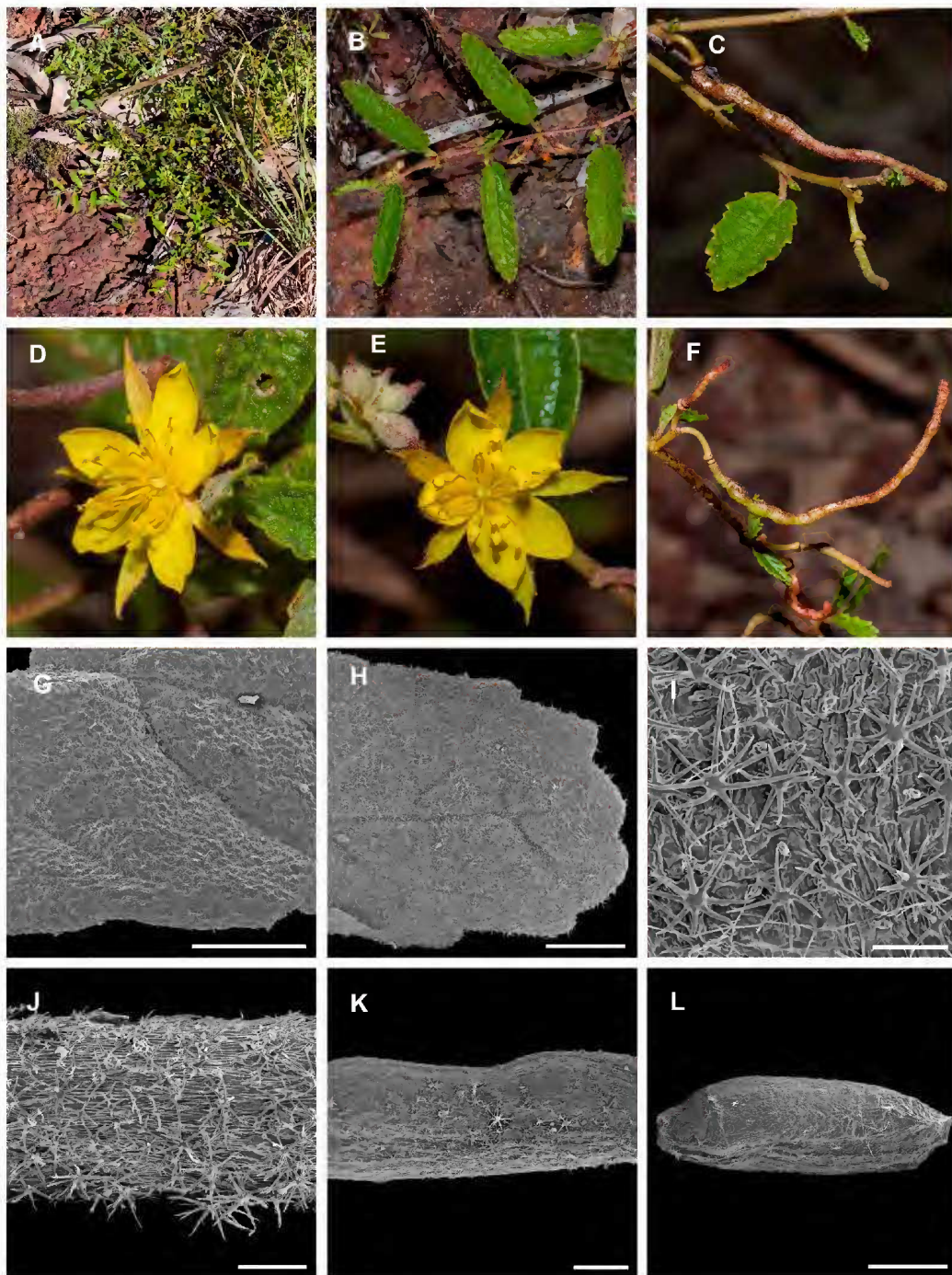


Fig. 1. *Corchorus drysdalensis*. A. habit. B. leafy branch with buds. C. leaf and fruit. D. flower. E. flower and buds. F. fruit. G. SEM of upper surface of mature leaf. H. SEM of upper surface of young leaf. I. SEM of indumentum on young leaf – note occasional cellular simple hairs among stellate hairs. J. SEM of stem indumentum. K. SEM of sparse indumentum on fruit. L. SEM of seed. Scale bars = 1 mm (G, H); 100 μ m (I); 200 μ m (J); 500 μ m (K, L). Images from Barrett RLB 8878 (PERTH). Photos: R.L. Barrett.

There is some superficial similarity of *C. drysdalensis* to *C. sp.* Fitzroy Crossing (A.J. Ewart s.n. PERTH 01526790), a larger, more openly branched subshrub endemic to the Fitzroy River basin which grows under riverine vegetation on sedimentary loam and can be distinguished by its pale grey-green (versus dark green) leaves with coarsely serrate (versus sinuose) margins and cuneate (versus obtuse or rounded) base; and sepals 2–2.6 (versus 2.6–4.2) mm long (S. Dillon pers. comm.).

Conservation status: *Corchorus drysdalensis* is to be listed as **Priority Two** under Department of Biodiversity, Conservation and Attractions Conservation Codes for Western Australian Flora (A. Jones pers. comm.). It is known to occur within Drysdale River NP.

Etymology: The specific epithet refers to the Drysdale River NP where this species was found. The vernacular name of ‘Drysdale River Corchorus’ is suggested.

2. *Grewia guazumifolia* Juss., *Ann. Mus. Natl. d’Hist. Nat.* 4: 89, pl. 48, fig. 3 (1804), [as ‘*guazumaefolia*’]. **Type:** Indonesia. ‘Inde’ [Java], in 1799, *Lahaie s.n.* [herb. A. de Jussieu 12555] (holo: P-JU, image!).

Grewia glabra Blume, *Bijdr. Fl. Ned. Ind.* 3: 115 (1825), non Mast. (1874). **Type:** Indonesia. Java, *s.dat.*, *C.L. Blume* 68 (lecto: L 0397620/Herb. Lugd. Bat. 908.253-1458 image!), *fide* Chung (2006: 17). **Probable isoelectotypes:** Indonesia. Java, *C.L. Blume s.n.* (?isoelecto: L 0064757/Herb. Lugd. Bat. 908.253-1301; L 0064758/Herb. Lugd. Bat. 908.253-1490; L 0064760/Herb. Lugd. Bat. 944.56-6; NY 00415417, U 0111074 [images seen for all]).

Grewia oblongifolia Blume, *Bijdr. Fl. Ned. Ind.* 3: 114 (1825). **Type:** Indonesia. [Java], *s.dat.*, *C.L. Blume s.n.* (lecto: L 0397618/Herb. Lugd. Bat. 951.341-895; isoelecto: L 0397619/Herb. Lugd. Bat. 951.341-896, *fide* Chung 2006: 17). **Syntypes:** Indonesia. Java, *s.dat.*, *C.L. Blume* 59 (syn: L 0064812/Herb. Lugd. Bat. 944.56-15); Java, *s.dat.*, *C.L. Blume* 407 (syn: L 0064810/Herb. Lugd. Bat. 944.56-10); Java, *s.dat.*, *C.L. Blume s.n.* (syn: L 0064806/Herb. Lugd. Bat. 908.253-175); L 0064811/Herb. Lugd. Bat. 944.56-11); Java, *s.dat.*,

C.G.C. Reinwardt s.n. (syn: L 0064805/Herb. Lugd. Bat. 908.253-147); Java, *s.dat.*, *H. Kuhl & J.C. van Hasselt s.n.* (L 0064809/Herb. Lugd. Bat. 951.341-893); [images seen for all].

Grewia osmoxylon Ridl., *J. Straits Branch Roy. Asiat. Soc.* 45: 180 (1906). **Syntypes:** Australia. CHRISTMAS ISLAND: North East Point, October 1904, *H.N. Ridley* 59 (syn: K 000686798); Rocky Point, 14 October 1904, *H.N. Ridley* 61 (syn: K 000686797); Kagu Wangu, *s.dat.*, *C.W. Andrews* 106 (syn: BM 000631000); [images seen for all].

[*Grewia multiflora* auct. non Juss.: B.L. Rye in J.R. Wheeler (ed.), *Fl. Kimberley Region* 167, fig. 45b (1992); J. Puruntatameri *et al.*, *Tiwi Pl. & Animals* 56, pl. (2001). R.C.K. Chung, *Edinburgh J. Bot.* 62: 15, fig. 7 (2006), *p.p.* as to synonyms from Java].

[*Grewia laevigata* auct. non Vahl: C.W. Andrews, *Monogr. Christmas Is.* 174 (1900); D. Brandis, *Indian Trees* 97, fig. 47 (1906)].

Illustration: Du Puy & Telford (1993: fig. 14), as *G. glabra*.

Notes: Chung (2006) clarified the distinction of *Grewia laevigata* Vahl (confused by Phengklai 1993 and many earlier authors), but included *G. glabra* Blume under a broad concept of *G. multiflora* Juss. This was followed by Ya Tang *et al.* (2007). Daniel & Chandrabose (1993) included *G. glabra* under *G. serrulata* DC. Following study of type specimen images available on JSTOR Plants and through L and P, I agree with Halford (1993, pers. comm.) that while closely related, northern Australian and at least southern East Asian collections are distinct from *G. multiflora*, and the earliest name available for the taxon appears to be *G. guazumifolia* Juss. which is adopted here. Excellent images of *G. multiflora s. str.* can be found in *Co’s Digital Flora of the Philippines* (www.philippineplants.org). The name *Grewia didyma* Roxb. ex G.Don from India has not been critically evaluated here and it is tentatively included under *G. multiflora* as designated by Chung (2006), but it may also belong under *G. guazumifolia*.

Grewia multiflora has more glossy leaves with more acute serrations, a courser stellate indumentum on the leaves, petioles and peduncles, a finer inflorescence with more slender peduncles, yellowish rather than white petals, and shorter staminal filaments relative to *G. guazumifolia*. Australian plants are illustrated in **Fig. 2**.

3. *Grewia pindanica* R.L.Barrett sp. nov. with affinity to *G. savannicola*, but differing by the following combination of characters: large shrub to 2 m high; juvenile leaves *c.* orbicular; flowers functionally unisexual male or bisexual; stigma lobes with small, blunt apical projections (obscure when dry). **Typus:** Western Australia. KIMBERLEY DISTRICT: north of Broome [precise locality withheld for conservation reasons], 1 May 2011, *R.L. Barrett, M. Henson, R. Graham & M. Stone* RLB 7065 (holo: PERTH; iso: BRI, CANB, DNA, K, NSW).

[*Grewia retusifolia* auct. non Kurz; K.F. Kenneally *et al.*, *Broome & Beyond: Pl. & People Dampier Peninsula, Kimberley, West. Austral.* 193, pl. (1996)].

Erect to spreading shrub to 2 m high, with few to many stems arising from perennial woody rootstock, main stems to 8 mm diam. Young branchlets stellate-tomentulose with hairs of two size classes; older branchlets retaining short stellate hairs. Leaves obovate to elliptic-obovate, 6.5–9.5 cm long, 3–5.5 cm wide, sparsely stellate-puberulous above, densely greyish white stellate-tomentulose below, 3-nerved from the base; margin irregularly serrate; apex acute, sometimes shallowly 3-lobed; base obtuse; petioles 6–12 mm long, densely stellate-tomentulose. Juvenile leaves broader and shorter, *c.* orbicular, 20–40 mm long, 24–53 mm wide. Stipules linear, 2.2–3.2 mm long, stellate-tomentulose. Inflorescences axillary umbellate cymes; peduncles 3.5–7.2 mm long, 1–3 flowered, 1–3 cymes per axil; pedicels 2.1–9.2 mm long; bracts linear, 2–3 mm long, all parts stellate-tomentulose. Buds obloid, 3–4 mm long. Flowers functionally unisexual male, or bisexual. Sepals 4 or 5, narrowly elliptic-ovate, 4.3–5.6 mm long, 1.5–2 mm wide, white, densely stellate-pubescent outside, glabrous inside; apex acute. Petals 4

or 5, oblong, 2–3.2 mm long, 0.7–1 mm wide; white, mostly glabrous but with an arch of dense villous hairs spreading from the base, across the centre of the inside of each petal around the basal nectariferous gland which is 0.8–1.2 mm diameter, not or slightly wider than the base of the lamina; outside face of gland with dense, small papillae. Androgynophore angular, *c.* 2 mm long, glabrous in lower half, densely hairy in apical half, elongated above the node. Male flowers: stamens 16–40; filaments white, 3.5–5.4 mm long; ovary and style rudimentary. Bisexual flowers: stamens 20–32, remaining white and possibly non-functional, though some dehiscence has been observed; filaments white, 1.3–3.2 mm long; ovary globose, 1.5–2 mm diameter, strigose, 2-locular, 4 ovules per loculus; style stout, 2.3–4.1 mm long, glabrous; stigma with 3 or 4 broad lobes; lobes with small, blunt apical projections (obscure when dry). Fruit of 2 bilobed parts, 6.1–6.2 mm long, 10–11 mm wide, conspicuously 4-lobed or commonly 2- or 3-lobed by abortion, sparsely white stellate-pubescent. **Fig. 3**.

Additional specimens examined: Western Australia. KIMBERLEY DISTRICT: [localities withheld for conservation reasons] Sep 2011, *Barrett RLB 7460* (PERTH); Sep 2011, *Barrett RLB 7465* (PERTH); Jul 1988, *Blaxell 88/051 & Wrigley* (NSW); Nov 2004, *Byrne 1295* (AD, PERTH); Jan 2005, *Byrne 1295-1* (PERTH); Jul 1978, *Carr 4408 & Beaulehole 48186* (PERTH); May 2010, *Dauncey H 420* (PERTH); Feb 1985, *Foulkes 107* (PERTH); Apr 1985, *Foulkes 139* (PERTH); Jun 1984, *Kenneally 9024* (PERTH); Feb 1992, *Mitchell 2014* (PERTH); Jun 2007, *Reiffer SR 020* (PERTH); Jul 1988, *Sands 5146* (K, PERTH); Apr 1985, *Smith MS 85-18* (PERTH); Jun 2006, *Sweedman 6789* (KPBG, PERTH); Oct 1984, *Willing 141* (PERTH); Jun 1988, *Wilson 12828* (PERTH); Nov 1986, *Wilson 12565* (PERTH); Nov 1986, *Wilson 12570* (PERTH).

Distribution and habitat: *Grewia pindanica* has a scattered occurrence from Broome, Pender Bay and James Price Point to Marion Downs Station and the Oscar Range in the south-west Kimberley region of Western Australia. The plant grows in pindan woodland on sandplains, commonly with *Acacia eriopoda* Maiden & Blakely, *Aristida latifolia* Domin, *Bridelia tomentosa* Blume, *Eriachne pindanica* R.L.Barrett, *Ficus aculeata* A.Cunn. ex. Miq., *Flueggea virosa* subsp. *melanthesoides* (F.Muell.) G.L.Webster,



Fig. 2. *Grewia guazumifolia*. A, B. leafy branchlet. C. leaf surfaces and margins. D. flowering branchlet. E, F. buds and bisexual flowers. G. Fruiting branchlet. H, I. fruit. A–C. Berthier Island (RPS - BBG consultants 460, PERTH). D, F–I. South Maret Island (RPS - BBG consultants 461, PERTH). E. North Maret Island (no voucher). Photos: R.L. Barrett.

Gardenia pyriformis subsp. *keartlandii* (Tate) Puttock, *Grewia breviflora* Benth., *Gyrocarpus americanus* subsp. *pachyphyllus* Kubitzki, *Pterocaulon intermedium* (DC.) A.R.Bean and *Spermacoce occidentalis* Harwood.

Phenology: Flowering from January to July. Fruiting from February to September.

Affinities: *Grewia pindanica* is similar in general appearance to *G. savannicola* and probably closely related, differing in the compact few- or multi-stemmed habit (versus many spreading clonal stems); broad juvenile leaves 20–40 mm long, 24–53 mm wide (versus 28–45 mm long and 17–25 mm wide); flowers functionally unisexual male or bisexual (versus flowers functionally unisexual male or functionally unisexual

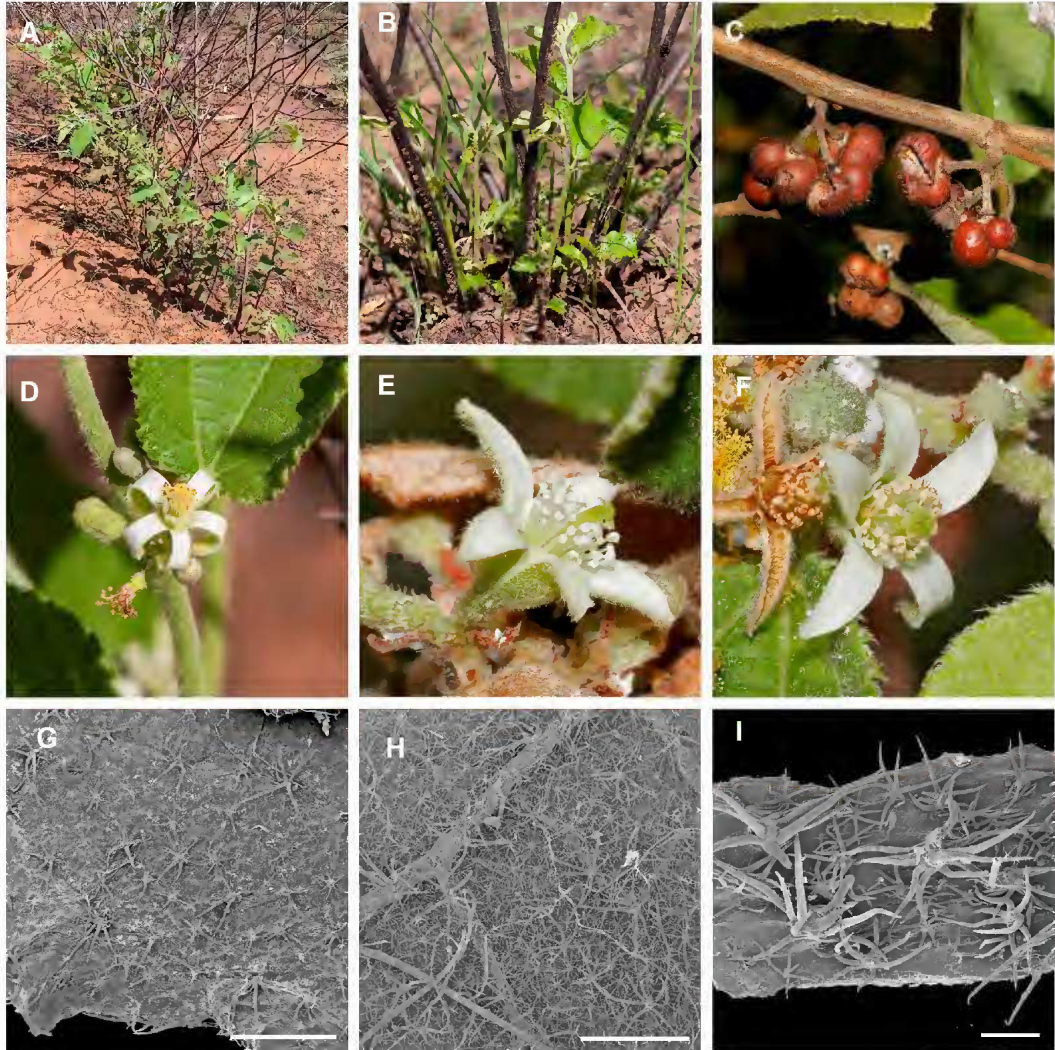


Fig. 3. *Grewia pindanica*. A. plants resprouing following fire. B. juvenile leaves post-fire. C. fruit. D. inflorescence with buds, fresh functionally male flower and old flower. E, F. bisexual flower. G. SEM of upper surface of leaf. H. SEM of lower surface of leaf. I. SEM of stem indumentum. Scale bars = 1 mm (G, H); 200 µm (I). All from Barrett *et al.* RLB 7065 (PERTH). Photos: R.L. Barrett.

female with few staminodes); stigma lobes with small, blunt apical projections (versus many, and long-filiform). *Grewia pindanica* is possibly also related to *G. eriocarpa* Juss. which differs in being a small tree to 8 m with large stipules 5–10 (versus 2.2–3.2) mm long and papery (versus coriaceous) leaves (see Ya Tang *et al.* 2007).

Notes: *Grewia pindanica* is an important species for indigenous people on the Dampier Peninsula, where it is known as *wombanyilinyli* (Kenneally *et al.* 1996).

This species has been successfully cultivated from seed and grown in the Kings Park Botanic Garden in Perth, Western Australia.

Conservation status: *Grewia pindanica* is to be listed as **Priority Three** under Department of Biodiversity, Conservation and Attractions Conservation Codes for Western Australian Flora (A. Jones pers. comm.).

Etymology: The epithet refers to the pindan habitat in which this species is found. The vernacular name of ‘pindan dogs-balls’ is suggested.

4. *Grewia savannicola* R.L. Barrett sp. nov. with affinity to *G. pindanica*, but differing by the following combination of characters: small shrub usually < 0.8 m high; stipules 5–6 mm long; bisexual flowers with 10–15 stamens; fertile stigma lacinate, with many fine \pm filiform lobes. Differs from *G. retusifolia* in being a small, lignotuberous shrub, usually < 0.8 m high, rather than a large shrub or small tree to 5 m. The fertile stigma of *G. retusifolia* is \pm 4-lobed, rather than lacinate. **Typus:** Queensland. SOUTH KENNEDY DISTRICT: Black Wattle Creek crossing, 21.6 km N of Belyando Crossing on Gregory Development Road, 22 April 2006, D.A. Halford Q8999 & G.N. Batianoff (holo: BRI [AQ0783407], image!; iso: DNA n.v., MEL 2327666, NSW 840845).

Grewia polygama var. *elliptica* Domin, *Biblioth. Bot.* 22(89): 930 (1927). **Type:** Queensland. COOK DISTRICT: in xerodrymio ad pedem montis Metall Mts. apud opp. Chillagoe, February 1910, K. Domin 6450 (holo: PR 529054, n.v.).

[*Grewia retusifolia* auct. non Kurz: K.A.W. Williams, *Native Pl. Queensland* 1: 139 (1979); J. Brock, *Top End Native Pl.* 210, pl. (1988); T. Low, *Wild Food Pl. Aust.* 117, pl. (1991); B.L. Rye in J.R. Wheeler (ed.), *Fl. Kimberley Region* 168, fig. 45d (1992), p.p.; P. Bindon, *Bush Foods* 152, pl. (1996); J. Puruntatameri et al., *Tiwi Pl. & Animals* 56, pl. (2001); W. Cooper & W.T. Cooper, *Fruits Aust. Trop. Rainfor.* 544, (2004); P. Wijnjorrotj et al., *Jawoyn Pl. & Animals* 80, pl. (2005)].

[*Grewia latifolia* auct. non F. Muell. ex Benth.: E. Anderson, *Pl. Centr. Queensl.* 365, pl. (2016), p.p. as to BL & TR photos].

[*Grewia polygama* auct. non Roxb.: G. Bentham, *Fl. Austral.* 1: 271 (1863); I.M.

Crawford, *Trad. Aboriginal Pl. Res. Kalumburu* 57 (1982); K. Menkhurst & I.D. Cowie, *Survey Wildl. Veg. Purnululu Nat. Pk* 46 (1992)].

Erect to spreading shrub to 0.8 (rarely to 1.5) m high, usually with many stems arising from perennial woody rootstock, main stems to 4 mm diameter. Young branchlets stellate-tomentulose with hairs of three size classes; older branchlets retaining short stellate hairs. Leaves broadly to narrowly elliptic or narrow ovate-elliptic, (4–)5–10.5(–13) cm long, (1.5–)1.8–3.8(–4.5) cm wide, sparsely stellate-puberulous above, densely whitish stellate-tomentulose below, 3-nerved from the base; apex acute or attenuate; base obtuse, sometimes oblique; margin irregularly serrate; petioles 3–8 mm long, densely stellate-tomentulose. Juvenile leaves elliptic to ovate-elliptic, 20–55 mm long, 15–30 mm wide. Stipules linear, 5–6 mm long, stellate-tomentulose. Inflorescences axillary umbellate cymes; peduncles 2.5–9 mm long, 2–4 flowered, 1(–3) cymes per axil; pedicels 2–6(–10) mm long; bracts linear, 2–4 mm long, all parts stellate-tomentulose. Buds obloid, 3–4 mm long. Flowers functionally unisexual male, or functionally unisexual female. Sepals (4)5(6), linear to narrowly elliptic, 5–7.1 mm long, 0.8–2.1 mm wide, white, densely stellate-pubescent outside, glabrous inside; apex acute. Petals (4)5(6), oblong, 1.5–2.3 mm long, 0.7–0.9 mm wide, white; with scattered papillae outside, mostly in the lower half, and an arch of dense villous hairs spreading from the base, across the centre of the inside of each petal around the basal nectariferous gland which is 0.5–0.6 mm diameter, not wider than the base of the lamina; outside face of gland \pm smooth. Androgynophore angular, 0.5–0.8 mm long, glabrous in lower half, densely hairy in apical half, elongated above the node. Male flowers: stamens 18–36; filaments white, 2–4.5 mm long; ovary and style rudimentary. Functionally female flowers: stamens 10–28; filaments 1.5–2.1 mm long, white, anthers remaining white to pale brown, small and probably always non-functional; ovary \pm globose, 1.1–1.5 mm diameter, densely long-strigose, 2-locular, 4 ovules per loculus; style

stout, 2.2–2.6 mm long, glabrous; stigma broadly capitate, laciniate, with many fine \pm filiform lobes. Fruit of 2 bilobed parts, 5.7–7.5 mm long, 6.5–13 mm wide, conspicuously 4-lobed or commonly 2- or 3-lobed by abortion, sparsely white stellate-pubescent, sometimes glabrescent reddish-brown, glossy. **Fig. 4.**

Additional selected specimens examined: **Papua New Guinea.** MOROBE PROVINCE: Sumsum, Mar 1960, *Henty NGF11974* (CANB); Buzi Village, S coast of mainland PNG, c. 1 km E of the mouth of the Maikusa River and N of Boigu Island, Jun 1999, *Mitchell 5836 & Gei* (CANB); S coast near Kwikila, Abau Sub-district, Jun 1969, *Pajmans 777* (CANB). **Australia.** **Western Australia.** KIMBERLEY DISTRICT: Wulwuldji, near Saming Mining Camp at crossing of Swamp Creek, May 1984, *Forbes 2021* (CANB, DNA, MEL, PERTH); Surveyors vine thicket, Mitchell Plateau, Feb 1979, *Kenneally 7097* (MEL, PERTH); Mornington Wildlife Sanctuary, Clean Skin Pocket, Apr 2005, *Legge MULE 459* (MEL, PERTH). **Northern Territory.** VICTORIA RIVER DISTRICT: Gregory NP, Depot Creek, c. 27 km ENE Limbunya, Apr 1996, *Cowie 6305 & Jones* (DNA, MEL); Macadam Range, Oct 1855, *Mueller s.n.* (MEL 1599193); near Flapper Hills, c. 4 miles [6 km] NW of Leguna Station, Jul 1949, *Perry 2604* (CANB, DNA, MEL). ARNHEM DISTRICT: 'Island of N. Coast', 1818, *Cunningham 186* (CANB, NSW); Gulf of Carpentaria, Maria Island, Jul 1972, *Dunlop 2866* (CANB, DNA, PERTH); c. 12 km S of Larrimah on Stuart Highway, May 1985, *Fryxell, Craven & McD. Stewart 4434* (AD, CANB, DNA); Hemple [Hempel] Bay, Groote Eylandt, in the Gulf of Carpentaria, Apr 1948, *Specht 290* (AD, CANB, MEL, NSW, PERTH). **Queensland.** COOK DISTRICT: New Holland [near Endeavour River], in 1770, *Banks & Solander s.n.* (NSW 133441); Kamerunga, Jun 1892, *Bailey s.n.* (NSW 263445); 5.2 km E of Davies Creek Road from Kennedy Highway, Feb 1992, *Neldner 3668* (BRI, CNS, DNA, NSW); 2 km (by road), SE of Rookwood Homestead, on Burke Developmental Road, c. 6 km NW of Mungana, Jun 1983, *Conn & de Campo 1345* (AD, BRI, CANB, MEL, NSW); O'Briens Creek gemfields via Mount Surprise, Jul 1994, *Coveny 16757 et al.* (BRI, CANB, MEL, NSW); 28 miles [46.6 km] N of Conjuboy Station, Feb 1954, *Lazarides 4206* (BRI, CANB, DNA, MEL, NSW). BURKE DISTRICT: Sweets Island, South Wellesley Group, Gulf of Carpentaria, Nov 2002, *Thomas SW1113 & Pedley* (BRI, DNA, NSW); 104 km W of Wollagorang, on road to Doomadgee, Apr 1992, *Halford Q1033* (AD, BRI, DNA, L, NSW). NORTH KENNEDY DISTRICT: Strathdickie North, Feb 1937, *Macpherson 4420* (NSW). LEICHHARDT DISTRICT: Comet River, Mar 1844, *Leichhardt 444* (NSW 263448). PORT CURTIS DISTRICT: Bay of Inlets, May 1770, *Banks & Solander s.n.* (BRI [AQ0268445], MEL 1599071); 'East coast' [Keppel Bay], Aug 1802, *Brown s.n.* (CANB 278649, NSW 263460); 'North and east coast', [1802], *Brown s.n.* (MEL 1599074); Rockhampton, 1864–66, *Deitrich 2340* (HBG n.v.; MEL, NSW).

Distribution and habitat: *Grewia savannicola* occurs in Australia and New Guinea. It is widespread from north of Derby in the West Kimberley, east to Gladstone in Queensland, north to the Torres Strait and southern parts of Papua New Guinea. Plants grow in open woodlands, forests and grasslands, often on basalt soils or black, cracking clays. They commonly grow with *Corymbia* spp., *Eucalyptus* spp., and *Planchonia careya* (F.Muell.) R.Knuth with an understorey dominated by *Chrysopogon* spp., *Cymbopogon* spp., *Heteropogon contortus* (L.) P.Beauv. ex. Roem. & Schult. and *Sarga* spp.

Phenology: Flowering mostly from November to April, but also sporadic in later months. Fruiting from December to July.

Affinities: *Grewia savannicola* is similar in general appearance to *G. pindanica* and *G. retusifolia*, differing from both by its smaller, many-stemmed habit and the shape of the stigma as described above. This species in Australia has continuously been associated with names based on Asian type specimens. With improved access to digital images of type specimens held in European herbaria, it has been possible to reevaluate the circumscription of names previously applied to the Australian taxon. I conclude that none of the names previously applied at specific rank apply, hence the Australian taxon is here described as a distinct species.

There has been considerable confusion of names in the literature, with most regional treatments failing to consider all applicable names, or assuming the taxon present in one country covers a great range of variation in other regions. This has led to suggestions that names such as *G. helicterifolia* Wallich ex G.Don might apply in Australia (Daniel & Chandrabose 1993), but that taxon is more closely allied to *G. hirsuta* Vahl. *Grewia polygama* Roxb. is not covered by Daniel & Chandrabose (1993), despite having been named from 'Bengal'. Ya Tang *et al.* (2007) use the name '*Grewia retusifolia* Pierre', a later homonym of *G. retusifolia* Kurz, which was described from Pegu (Bago) in southern Myanmar (Kurz 1872). It is therefore of



Fig. 4. *Grewia savannicola*. A. flowering branch. B, C. fruiting branch. D. fresh functionally male flower. E. bisexual flower. F. fruit. Images from A, E. Bachsten Creek. B, D. Theda Station (Barrett RLB 8826, PERTH). C. Middle Osborne Island. F. Doongan Station (Barrett RLB 7189, PERTH) (all Western Australia). Photos: R.L. Barrett.

interest that *G. retusifolia* is not considered in the neighboring *Flora of Thailand* (Phengklai 1993).

Grewia retusifolia is consistently described as a large shrub or small tree to 5 m. The leaves are often asymmetric at the base, and the margins very finely serrate. Inflorescences are usually 3-flowered. A fragment at P appears to be original material and is a probable isotype (P 05429303, image!). Specimens matching the type have been examined at NSW: (**Myanmar**. Manhkring, near Myitkyana, Burma, Jul 1958, *McKee* 6262; Plangyn, Sep 1902, *Mokin* 94; Sillotia roadside, Oct 1902, *Mokin* 392; Ruby mines, Burma, Sep 1909, *Rodger* D.O. 843).

Notes: *Grewia savannicola* is an important food and medicinal plant for indigenous groups across northern Australia, with sweet, edible fruit; leaves are used as a tobacco

substitute; or leaves and roots are crushed and boiled as an effective treatment for diarrhoea, and to create a poultice for boils and skin irritations, a use still in practice (Low 1990; Aboriginal Communities of the Northern Territory *et al.* 1993; Blake *et al.* 1998; Clark 2007; Cowie *et al.* 2011; Karadada *et al.* 2011; Leach *et al.* 2017).

It is noteworthy that this species was collected by Banks & Solander, Brown, and Mueller, but not recognised as distinct by any of these botanists. This reflects the challenges involved in reconciling the taxonomy of species or genera shared between Asia and northern Australia.

While the host of *Uredopeltis chevalieri* J.Walker & Shivas is listed as *G. breviflora* Benth. (Walker & Shivas 2004), it was actually *G. savannicola*, the original collection having been observed by the author.

Conservation status: *Grewia savannicola* is widespread and not threatened.

Etymology: The epithet refers to the distribution of this species coinciding with that of the savanna of northern Australia and southern Papua New Guinea. Known as ‘dog’s balls’, ‘emu berry’, ‘dogs nuts’, ‘dysentery bush’, ‘dysentery plant’ or ‘turkey bush’.

5. *Triumfetta kenneallyi* Halford, *Austrobaileya* 4: 531, fig. 5d (1997). **Type:** Western Australia. KIMBERLEY DISTRICT: Mitchell Plateau [precise locality withheld for conservation reasons], 30 April 1982, K.F. Kenneally 8186 (holo: PERTH 01547445; iso: BRI [AQ0717038], CANB 0498833, DNA [D0148649]).

[*Triumfetta rhomboidea* auct. non Jacq.: B.L. Rye in J.R. Wheeler (ed.), *Fl. Kimberley Reg.* 174, fig. 46f (1992)].

Perennial shrub, 0.2–1(–3) m high, to 0.7(–1.5) m across, much branched from the base; main stem usually procumbent, occasionally erect, branches erect to spreading. Indumentum on branchlets, petioles, peduncles and pedicels moderately dense to dense; hairs stellate, 0.2–1 mm diameter, with stiff rarely pliable, spreading to appressed rays. Leaves lanceolate to ovate, 10–95 mm long, 4.5–55 mm wide; discolorous; apex acute to slightly acuminate; base rounded or obtuse to slightly cordate; margin crenulate-serrulate; indumentum adaxially sparse to moderately dense, abaxially sparse to dense; hairs stellate, 0.4–1 mm diameter, with stiff, spreading rays. Petioles 2–20 mm long. Stipules filiform, 0.8–3 mm long, hirsutellous. Flowers 2–9, in axillary cymules; cymules 1–4 per node, occasionally arising well above node, often forming axillary panicle inflorescences by reduction of subtending leaves; peduncles 2.2–7 mm long; pedicels 0.7–14 mm long; bracts \pm linear to narrowly triangular, 0.6–2 mm long, hirsutellous. Sepals linear to narrowly ovate, 1.3–5 mm long, 0.3–1 mm wide; indumentum on abaxial surface dense, with stellate hairs 0.2–0.5 mm diameter, the adaxial surface glabrous to densely stellate villous near base; appendages subapical, erect, subulate, ovate or depressed obovate, 0.3–0.5 mm long,

entire, glabrous or stellate hairy, hairs c. 0.2 mm diameter. Petals linear-oblong, narrowly obovate to almost spatulate, 1.4–3 mm long, 0.3–0.7 mm wide; claw 0.6–1 mm long, ciliolate to pubescent. Androgynophore 0.2–0.3 mm long; glands ovate; annulus 0.2–0.5 mm long, a few cilia on margin. Stamens 4–6 (usually 5); filaments 1–3 mm long, glabrous; anthers subglobular to oblong, 0.05–0.5 mm long. Ovary subglobose, 0.6–1 mm diameter, 2- or 3-locular, with thick, recurved setae; style 0.7–2.5 mm long, glabrous; stigma 2 or 3-lobed. Fruit ellipsoid to subglobose or globose, round in cross section, 2–9 mm long, 1.6–7.2 mm wide, sparsely to densely covered with slender stellate hairs 0.2–0.5 mm diameter, sparsely to densely setose; prickles subterete to terete, tapering towards the apex, 0.8–3 mm long, erect, pliable, arranged randomly, c. evenly spread, almost glabrous with just a few simple hairs to 0.05 mm long, or with a sparse covering of stellate hairs c. 0.5 mm diameter near the base, terminated by a single hooked seta 0.3–0.5 mm long. **Fig. 5.**

Additional specimens examined: Western Australia. KIMBERLEY REGION: [localities withheld for conservation reasons]: Feb 2006, Barrett & Barrett RLB 3265A (BRI, DNA, PERTH); Jun 2012, Barrett RLB 7690 (PERTH); Jun 2012, Barrett RLB 7716 (CANB, PERTH); Mar 1989, Keighery 10693 (PERTH); Jun 1987, Kenneally & Hyland KFK 10494 (CANB, PERTH); Jun 1987, Kenneally & Hyland KFK 10269 (CANB, PERTH); May 1996, Mitchell 4375 (BRI, n.v., PERTH); Jul 1949, Perry 2650 (CANB, PERTH).

Distribution and habitat: *Triumfetta kenneallyi* is known from just nine locations in the vicinity of Mitchell Plateau, Doongan Station, Kalumburu and Carlton Hill Station. Found on broken sandstone ridges where it often grows under rock overhangs in small rock fissures with *Ficus brachypoda* (Miq.) Miq., *Panicum minutum* R.Br., *Plectranthus scutellarioides* (L.) R.Br. and *Stylidium notabile* A.R.Bean.

Phenology: Flowering and fruiting recorded for May to July.

Affinities: *Triumfetta kenneallyi* is distinguished from all other Australian species by the following combination of characters: Leaves discolorous, base obtuse

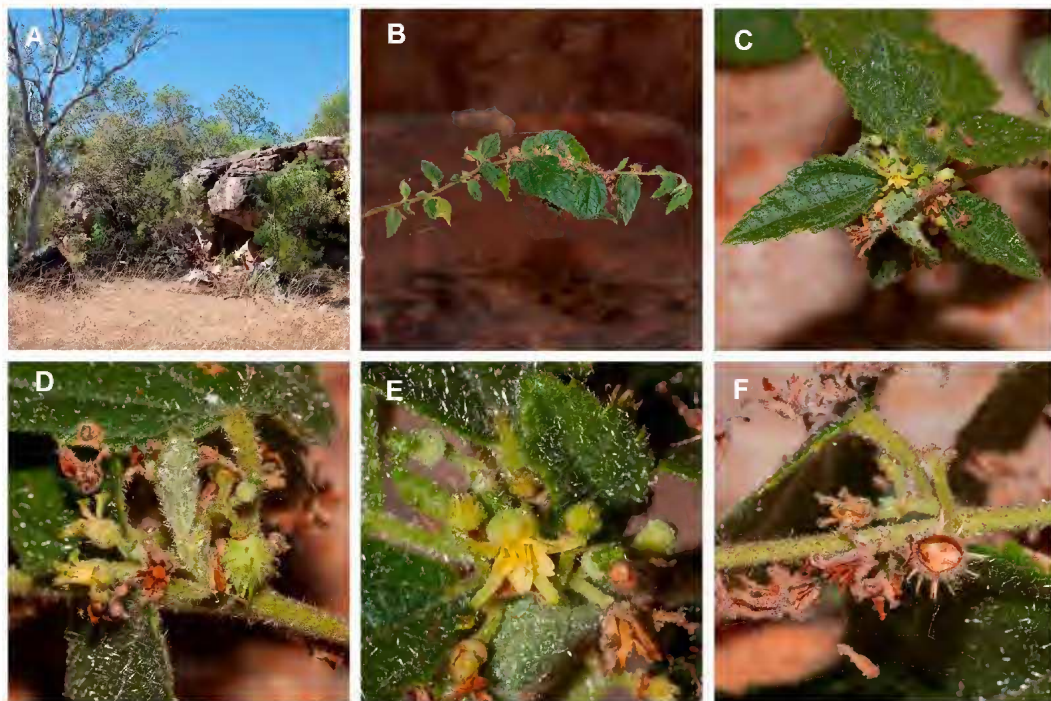


Fig. 5. *Triumfetta kenneallyi*. A. habitat. B. habit under rock overhang. C. leaves on flowering branchlet. D. fruiting and flowering branchlet. E. flower. F. fruit (partly eaten). A from Barrett RLB 7716 (PERTH); B–F from Barrett RLB 7690 (PERTH). Photos: R.L. Barrett.

to slightly cordate, 10–95 mm long, 4.5–55 mm wide. Petioles 2–20 mm long. Stipules filiform, 0.8–3 mm long. Flowers to 9, in axillary cymes; pedicels 0.7–14 mm long. Sepals 1.3–5 mm long, 0.3–1 mm wide. Petals linear-oblong, narrowly obovate to almost spatulate, 1.4–3 mm long, 0.3–0.7 mm wide. Anthers subglobular to oblong, 0.05–0.5 mm long. Fruit 1.6–7.2 mm wide, bristles 0.8–3 mm long, *c.* evenly spread, almost glabrous with just a few simple hairs, or with a sparse covering of stellate hairs, terminated by a single hooked seta.

Small plants are superficially similar in appearance to *Triumfetta coronata* Halford and *T. triandra* F.Muell., differing in the much smaller floral parts, discoloured leaves to 26 mm wide and fruit with setae evenly spread, not oriented in lines (as in *T. triandra*) nor clustered at the apex (as in *T. coronata*).

Notes: Most of the available collections have very few if any flowers and half have few or no fruit, so the collection of additional fertile collections is highly desirable. There is variability in the size of many organs between plants from open areas and those growing under rock overhangs and it is possible that further collections will warrant a re-examination of variation in this species.

Conservation status: *Triumfetta kenneallyi* is to be listed as **Priority Three** under Department of Biodiversity, Conservation and Attractions Conservation Codes for Western Australian Flora (A. Jones pers. comm.). It is only known from nine populations over a range of about 320 km.

Etymology: The epithet recognises the work of Kevin F. Kenneally in documenting the flora of the Kimberley region. The vernacular name of ‘Kenneally’s *Triumfetta*’ is suggested here.

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